Technology Opportunity

Imaging of Dense Spray

By using commonly available lasers and optics, a new technology enables imaging and monitoring of droplet distribution in optically dense environments. It can also be used to detect hidden objects in the environment, and thus may have space, industrial, biomedical, and materials applications. NASA Lewis researchers are interested in transferring this technology and in further developing the imaging system in partnership with potential users.

Potential Commercial Uses

- Feedback for rocket engine injector design
- Monitoring and/or feedback for fuel or oxidizer spray/atomization-based combustors
- Medical imaging
- Real-time imaging without hard radiation in various media

Benefits

- Processes can be imaged through highly scattering media
- No hard radiation (x-rays, gamma rays) employed
- Technique is nondestructive

The Technology

Optical techniques to image objects through highly scattering, opaque media are severely limited because of beam steering and extinction. The use of penetrating radiation is limited by the absorption properties of the material being imaged and by the health hazards posed to operators. Ultrafast lasers and optical switches enable a portion of the nondiffuse light to be utilized to image objects hidden by an
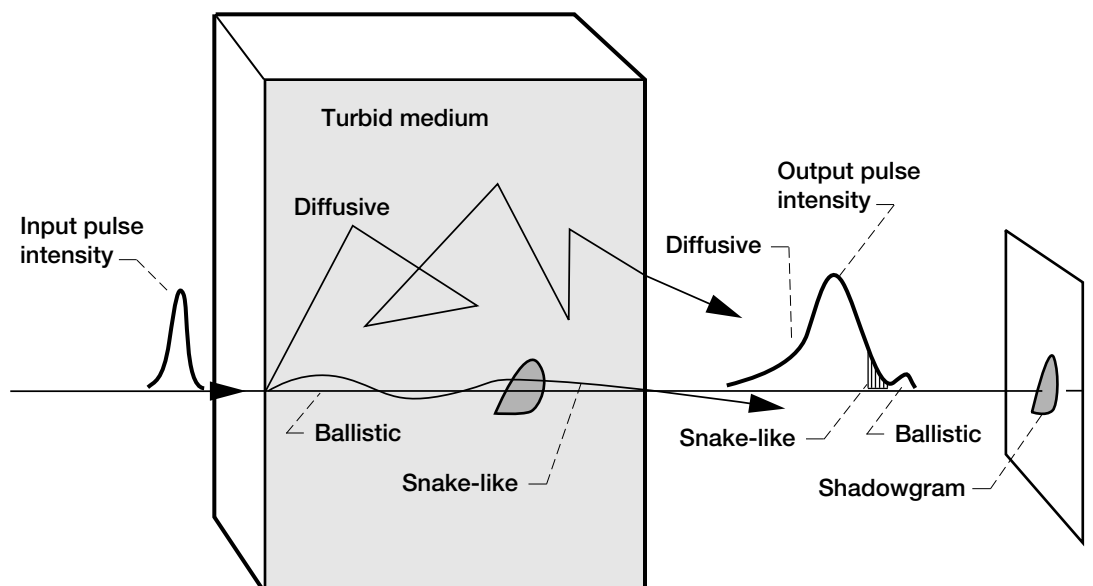
Three components of photons transmitted through a turbid medium.

opaque medium. NASA is primarily interested in imaging through the dense spray created by the hundreds of individual injection elements in a rocket combustor. A subscale prototype rocket injector has been tested with success and additional work is continuing to refine the technique.

Options for Commercialization

Seeking to further develop the imaging system in partnership with potential users in aerospace, automotive, and other industries.

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Key Words

Laser imaging
Spray